

Warmup

Write the equation given the following roots.

1. $\{3, -0.5\}$

$$2x^2 - 5x - 3 = 0$$

6-4 Completing the Square

ex 1

$$(x-5)^2 = 4$$

$$x^2 - 10x + 25 = 4$$

$$x^2 - 10x + 21 = 0$$

$$(x-7)(x-3) = 0$$

$$x=7 \quad x=3$$

$$(x-5)^2 = 4$$

$$x-5 = \pm 2$$

$$x = 5 \pm 2$$

$$\{7, 3\}$$

$$\text{ex 2} \quad \sqrt{(x-3)^2} = \sqrt{7}$$

$$x-3 = \pm\sqrt{7}$$

$$x = 3 \pm \sqrt{7}$$

$$\{3 \pm \sqrt{7}\}$$

$$\text{ex 3} \quad \sqrt{(2x-3)^2} = \sqrt{5}$$

$$2x-3 = \pm\sqrt{5}$$

$$2x = 3 \pm \sqrt{5}$$

$$x = \frac{3 \pm \sqrt{5}}{2}$$

$$\left\{ \frac{3 \pm \sqrt{5}}{2} \right\}$$

ex 4

$$x^2 - 6x - 3 = 0$$

$$x^2 - 6x + 9 = 3 + 9$$

$$\sqrt{(x-3)^2} = \sqrt{12}$$

$$x-3 = \pm 2\sqrt{3}$$

$$x = 3 \pm 2\sqrt{3}$$

Steps

1. Transform equation so constant (c) is alone on right side.

2. If $a \neq 1$, then divide both sides by a.

3. Add the square of one-half b to both sides.

4. Factor left side.

5. Solve.

$$+\left(\frac{b}{2}\right)^2$$

$$\left(\frac{-5}{2}\right)^2$$

ex 5

$$x^2 - 5x + 3 = 0$$

$$x^2 - 5x + \frac{25}{4} = \frac{-12}{4} \cdot 3 + \frac{25}{4}$$

$$\sqrt{\left(x - \frac{5}{2}\right)^2} = \sqrt{\frac{13}{4}}$$

$$x - \frac{5}{2} = \pm \frac{\sqrt{13}}{2}$$

$$x = \frac{5}{2} \pm \frac{\sqrt{13}}{2}$$

$$x = \frac{5 \pm \sqrt{13}}{2}$$

ex 6

$$2x^2 + 2x + 5 = 0$$

$$x^2 + x + \frac{5}{2} = 0 \quad \div 2$$

$$x^2 + x + \frac{1}{4} = \frac{-10}{4} \cdot \frac{5}{2} + \frac{1}{4}$$

$$\sqrt{\left(x + \frac{1}{2}\right)^2} = \sqrt{\frac{-9}{4}}$$

$$x + \frac{1}{2} = \pm \frac{3i}{2}$$

$$x = -\frac{1 \pm 3i}{2}$$

Do

$$1. 3x^2 + 12x + 1 = 0$$

$$x^2 + 4x + 4 = -\frac{1}{3} + 4$$

$$(x+2)^2 = \frac{11}{3}$$

$$x+2 = \pm \sqrt{\frac{11}{3}}$$

$$x = -2 \pm \frac{\sqrt{33}}{3}$$

$$2. x^2 - x - 1 = 0$$

$$x^2 - x + \frac{1}{4} = 1 + \frac{1}{4}$$

$$\sqrt{\left(x - \frac{1}{2}\right)^2} = \sqrt{\frac{5}{4}}$$

$$x - \frac{1}{2} = \pm \frac{\sqrt{5}}{2}$$

$$x = \frac{1 \pm \sqrt{5}}{2}$$

HW

p311

33-47 odd